



## **Modeling and Simulation: A *Critical Component of* *DoD Science & Technology***

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**Deputy Under Secretary of Defense (Science & Technology)**

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# DoD Science & Technology Mission

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**To ensure that the warfighters today and tomorrow have superior and affordable technology to support their missions, and to give them revolutionary war-winning capabilities**

# Revolutionary Capabilities

*Stealth*



*Adaptive Optics and Lasers*



*Night Vision*



DoD S&T



*GPS*

*Phased Array Radar*



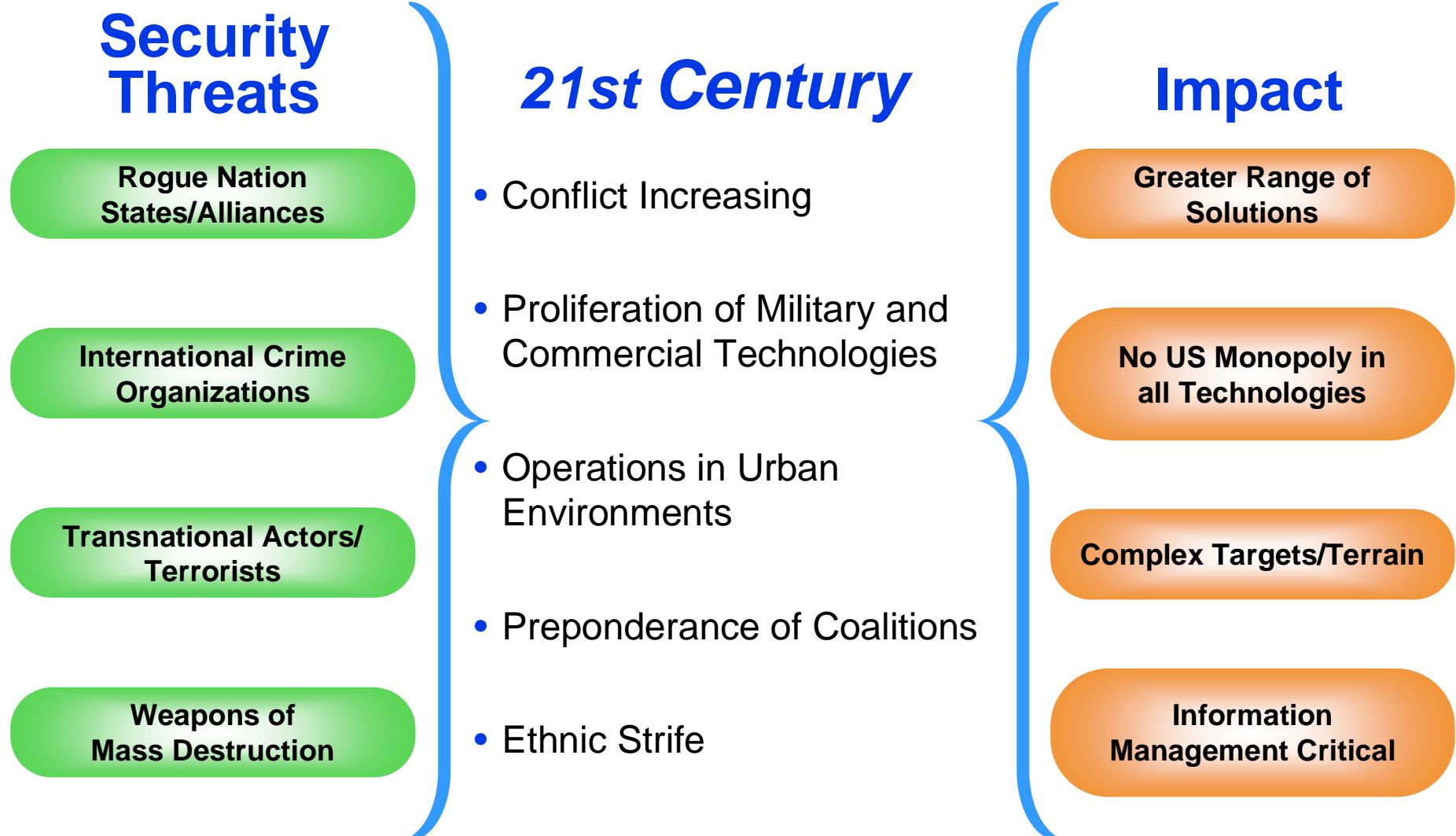


# Role of DUSD (S&T)





# Changing Environments



# FY2000 Research, Development, Test & Engineering (RDT&E) Funding



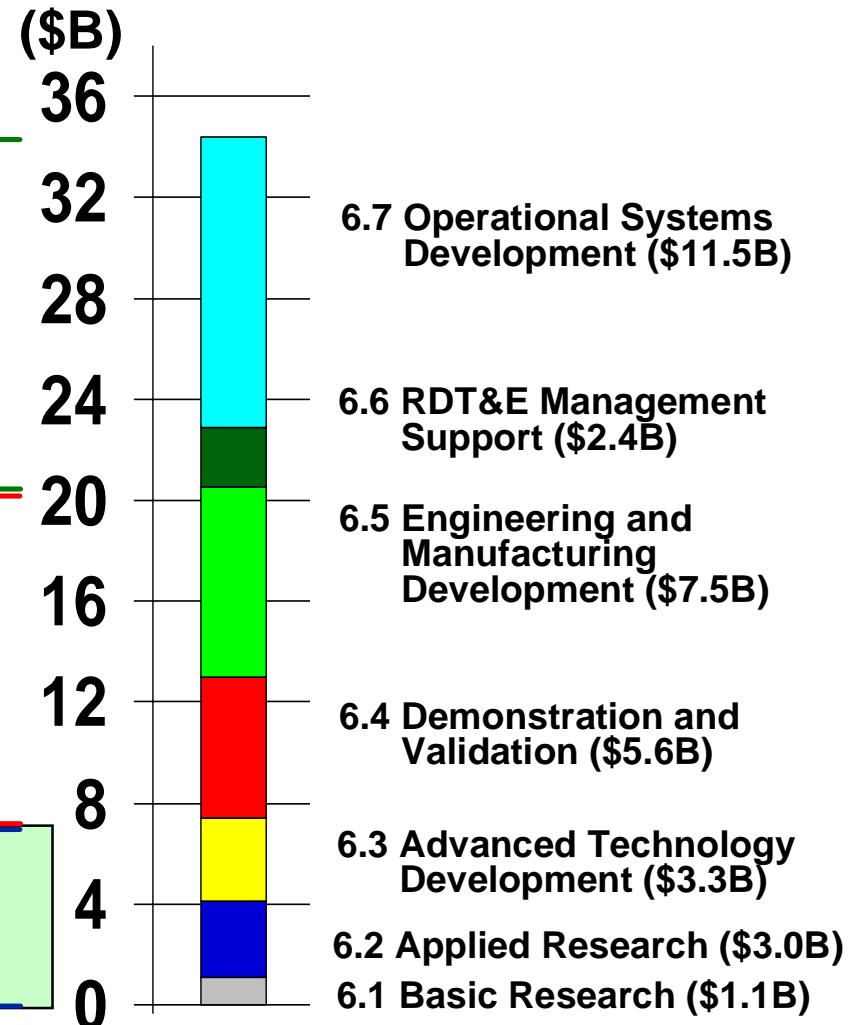
FY00 RDT&E = \$34.4B  
(6.1 thru 6.7)

(6.6 + 6.7 = \$13.9B)

Development  
(6.4 + 6.5 = \$13.1B)

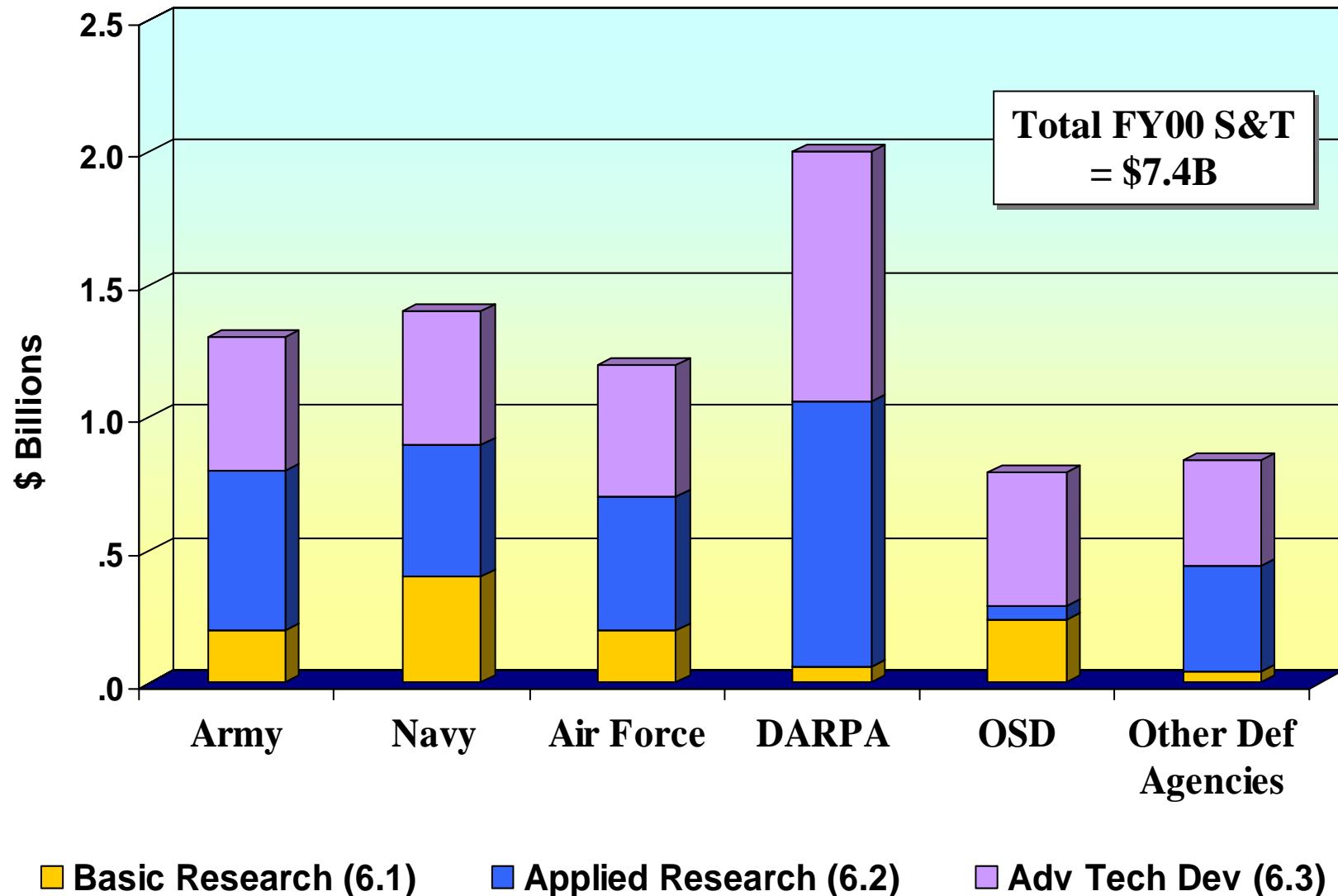
Technology Base  
(6.1 + 6.2 = \$4.1B)

Science and Technology  
(6.1 + 6.2 + 6.3 = \$7.4B)  
**21% of RDT&E**



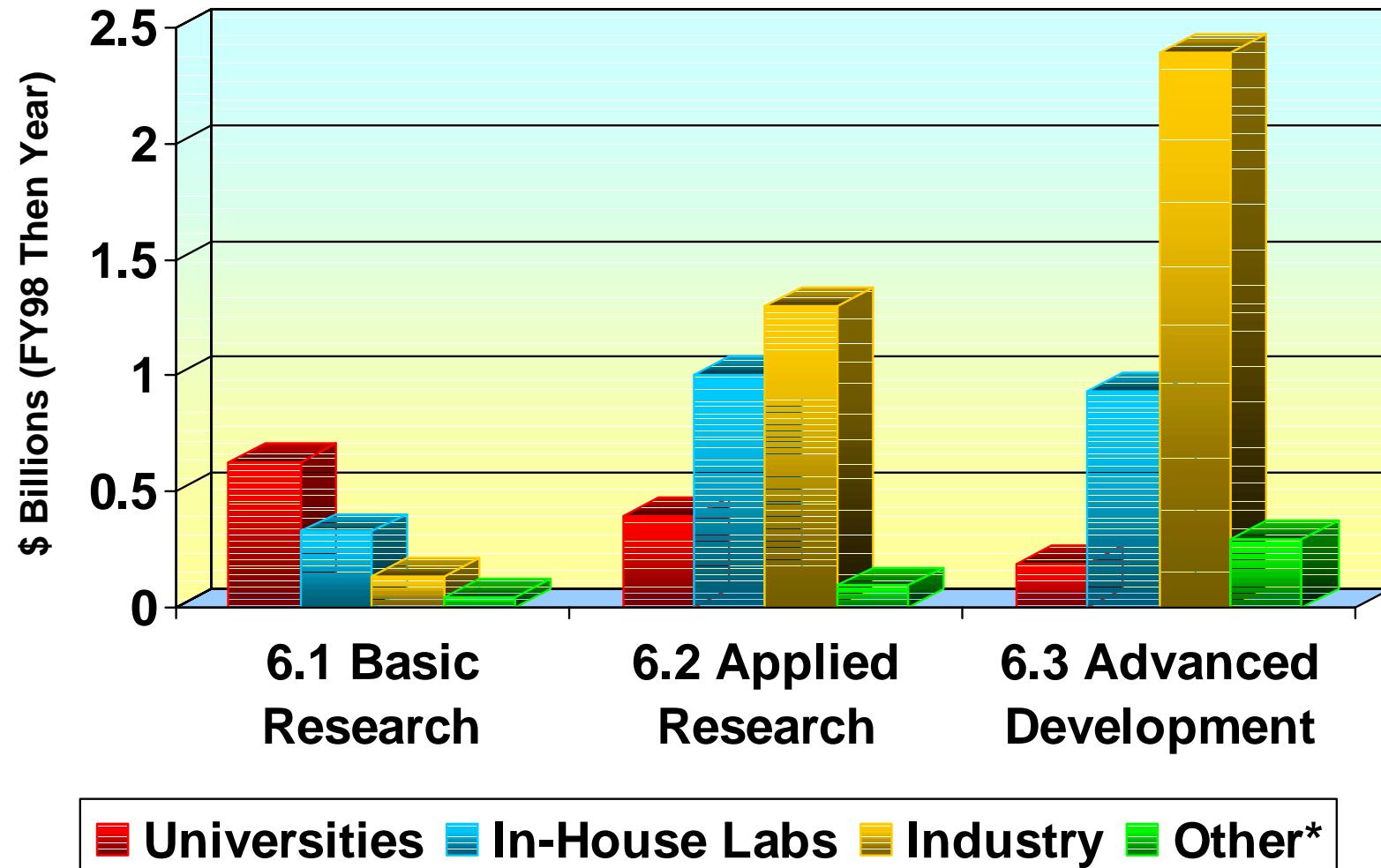


# DoD S&T Investment





# Recipients of DoD S&T Funds

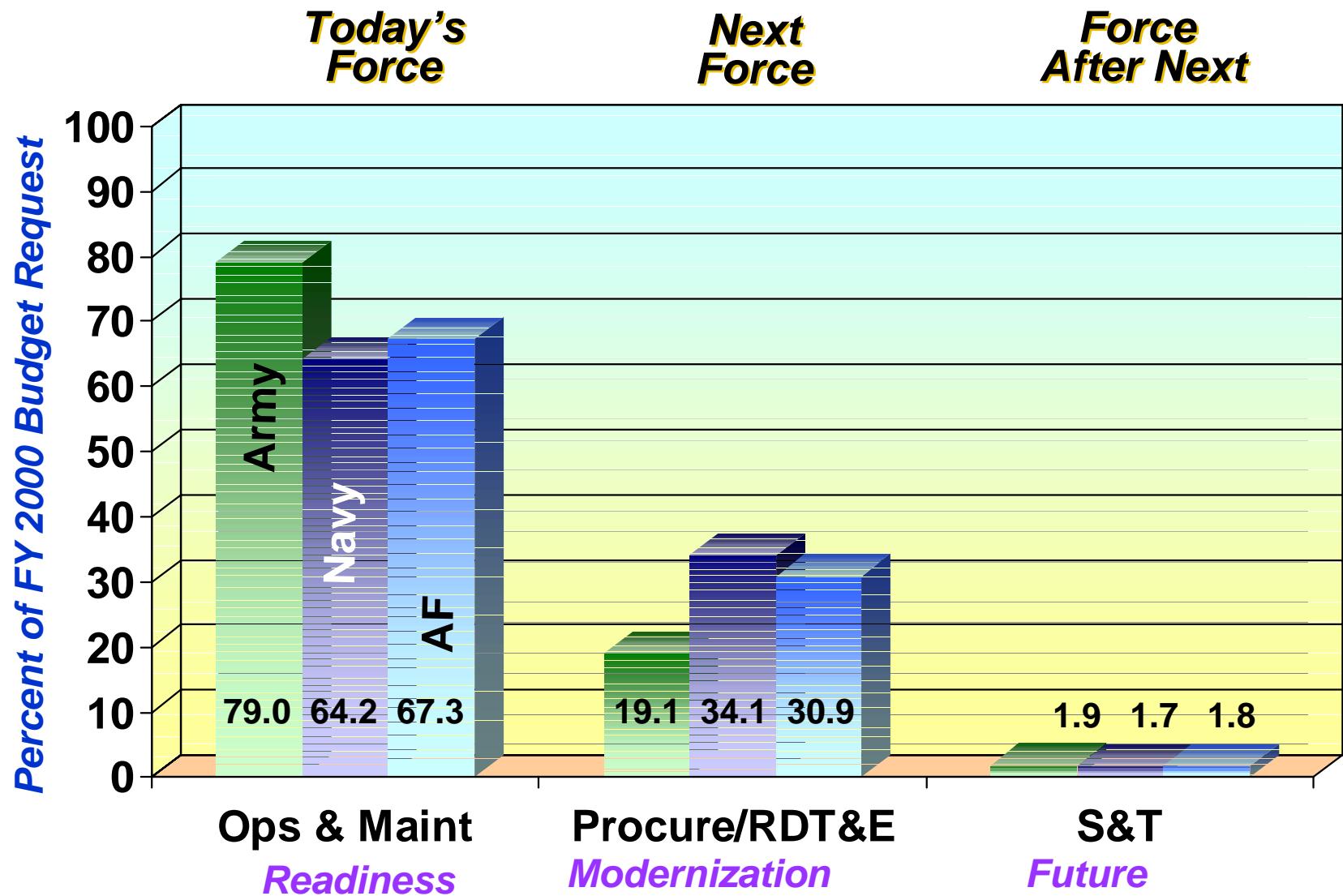


\*Includes non-profit institutions, State & local govt., & foreign institutions

Source: National Science Foundation Report, NSF 98-332 (FY 1998)



# DoD Investment Strategy

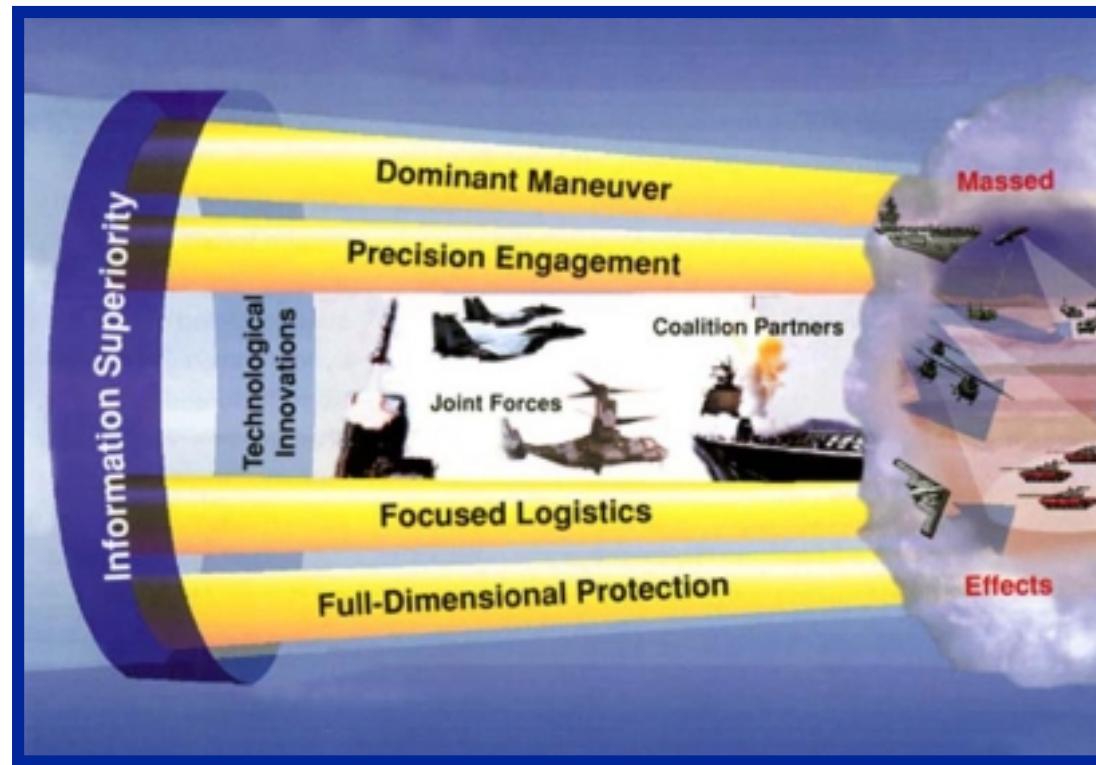


*Note: AF does not include NRO & Special Ops*



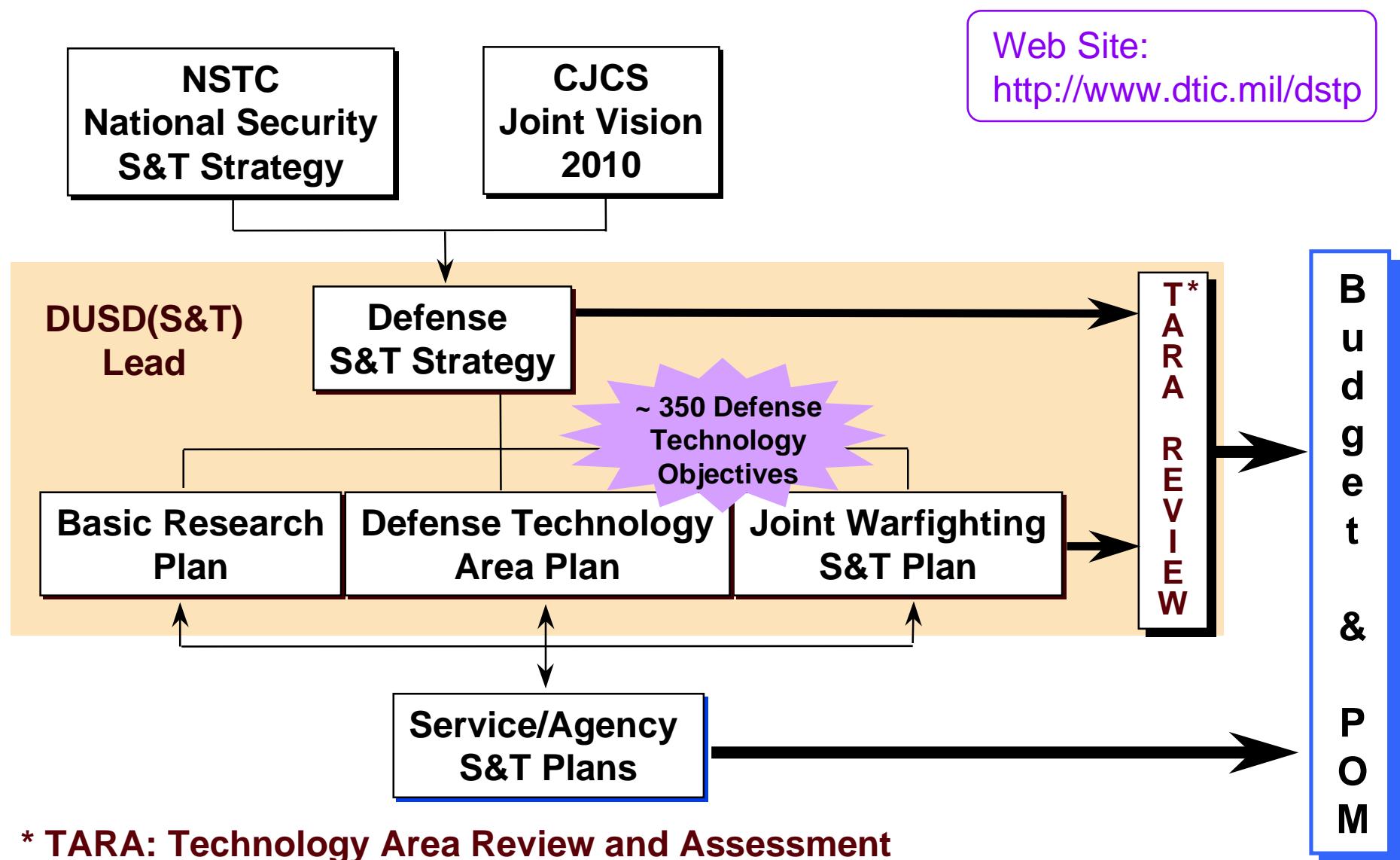
# Joint Vision 2010

Relies on Advancing Technology and Operational Warfighting Concepts



The Lenses of Technological Innovation and Information Superiority  
Integrate and Amplify Four New Operational Concepts

# Integrated Annual Defense S&T Planning Process



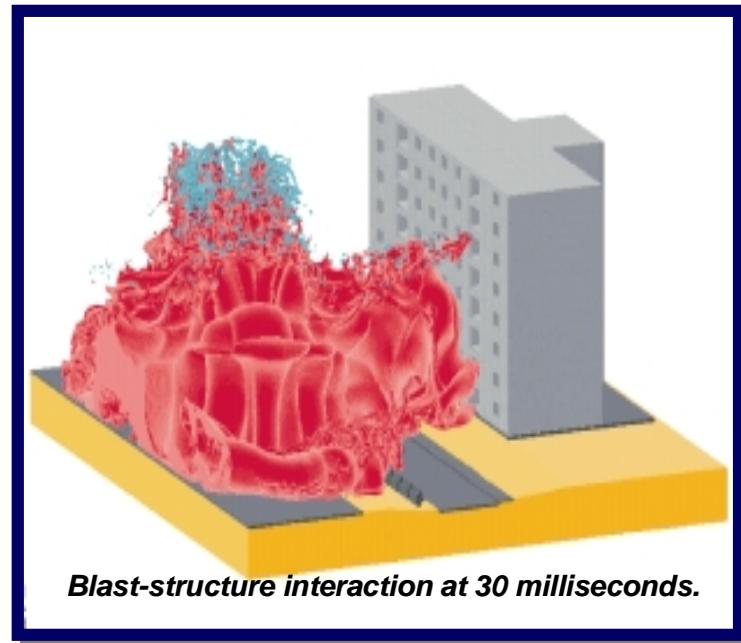
# Joint Warfighting S&T Plan (JWSTP)



- JWSTP--Focus to blend emerging technology into warfighter needs



Damaged Barracks in Saudi Arabia



Simulation of a terrorist explosion against a multistory building

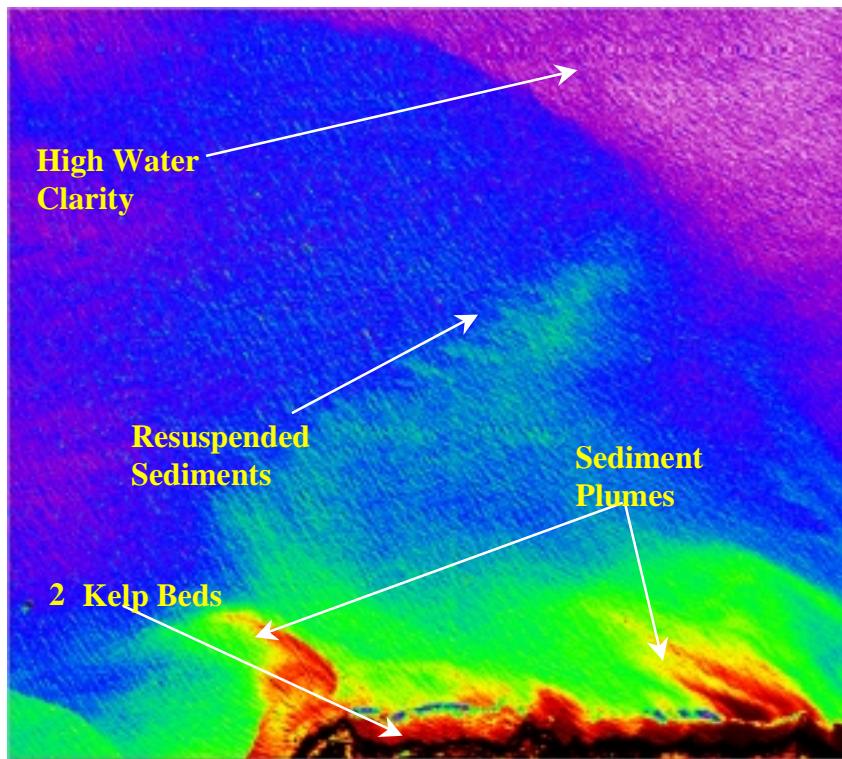
Example: **DTO L.06 Structural Blast Mitigation**

Objective: **Develop techniques to mitigate shock and blast damage in structures.**

# Defense Technology Area Plan (DTAP)



- DTAP--A detailed plan focusing DoD science on militarily significant technologies in specific functional areas



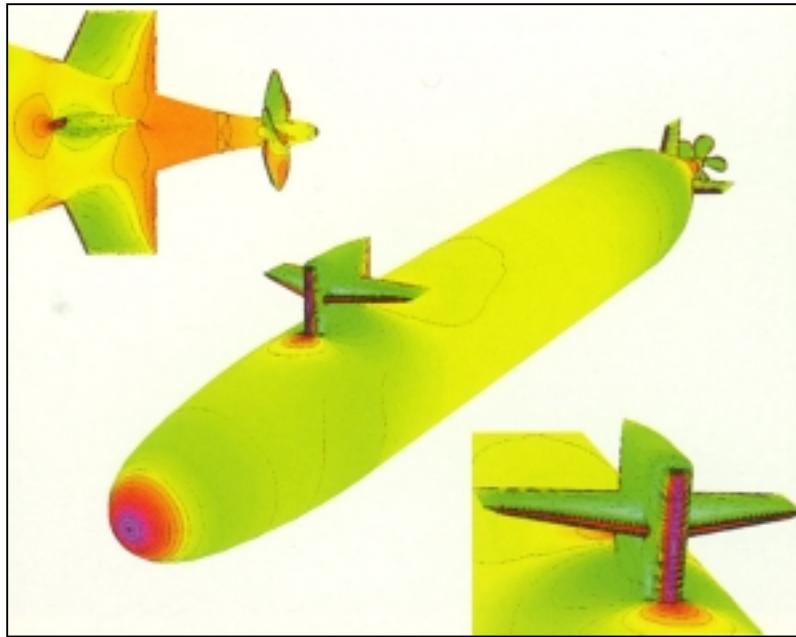
*An agreement  
between  
the S&T  
Community  
and Acquisition  
Customers*

Example: DTO SE.67 *Hyperspectral Technologies*

# Basic Research Plan (BRP)



**BRP--A strategic plan to link longer term research to broad, revolutionary warfighter capabilities**



*Computer-generated, color-coded pressure distributions around fully appended submarines.*

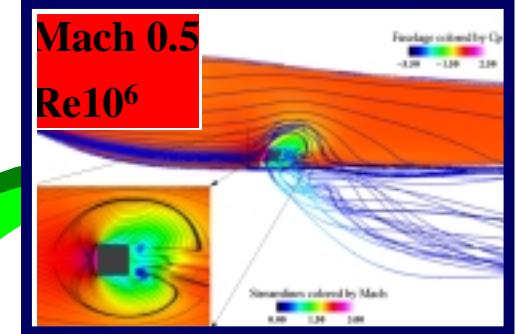
*A Strategic plan guiding new scientific research.*

Improved submarine designs without costly model construction

# Defense Technology Plan (DTAP) M&S Technology Focus



**IS.40 Individual Combat & Small unit Ops Simulation**



**IS.11 Simulation Information Technologies**



**M&S Applications  
(Analysis, Acquisition, & Training)**

**IS.12 Simulation Representation**



**IS.10 Simulation Interconnection**





# S&T Emphasis Areas

- Chemical & Biological Defense
- Hardened and Deeply Buried Targets
  - Smart Sensor Web
  - Cognitive Readiness
  - Information Assurance

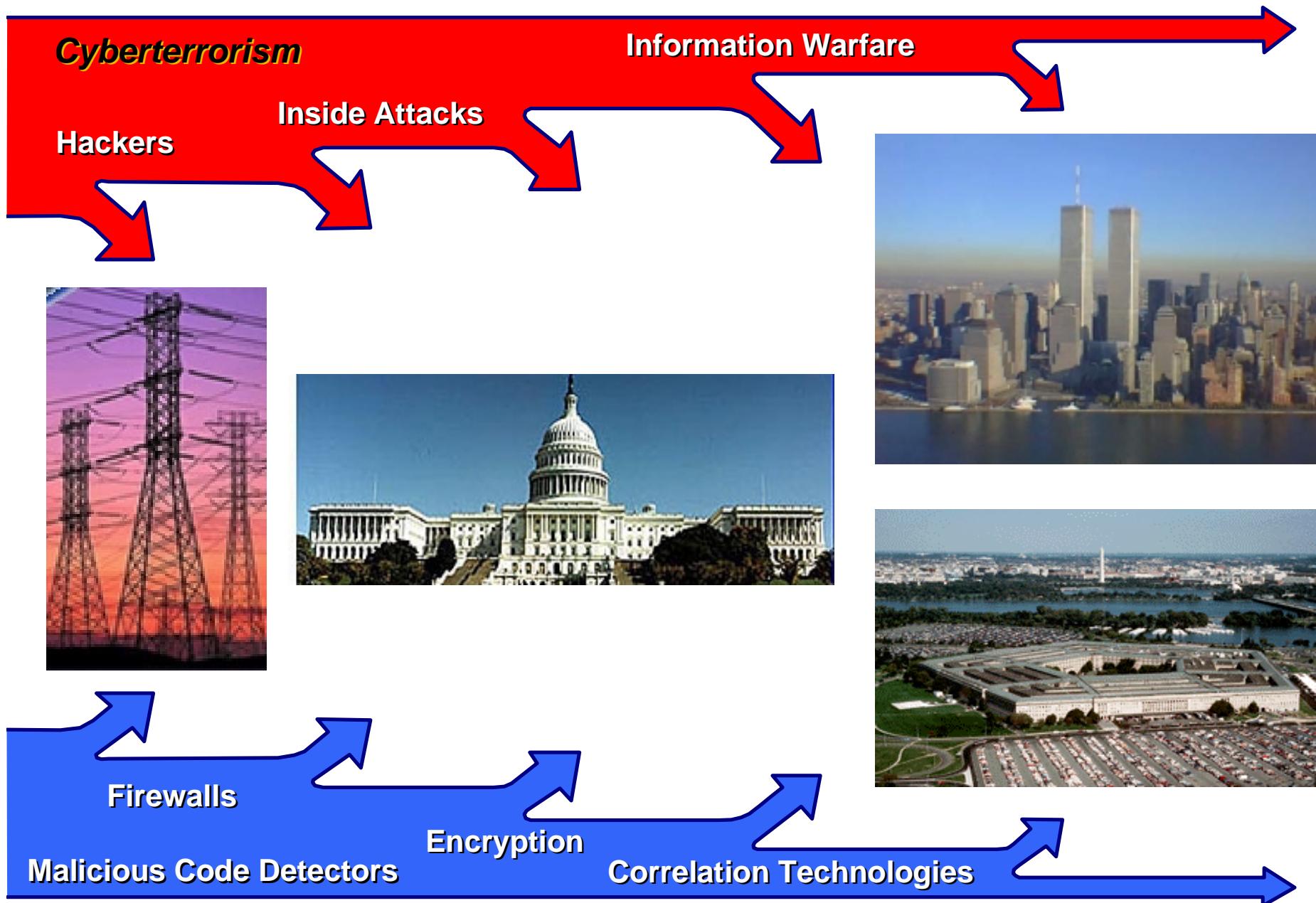
## *S&T Integration*

- HPCMP
- DMSO

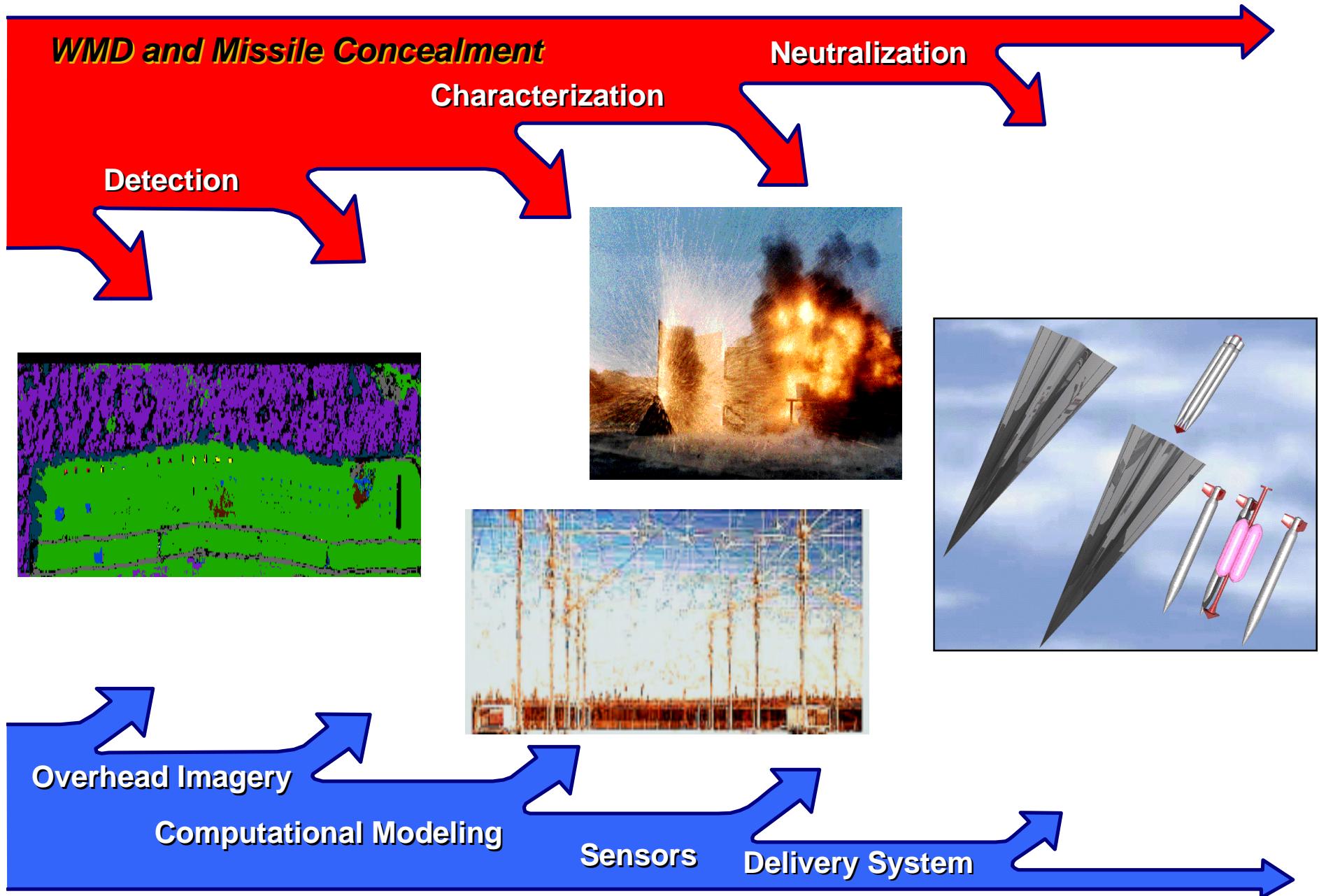
# Chemical & Biological Defense



# Information Assurance



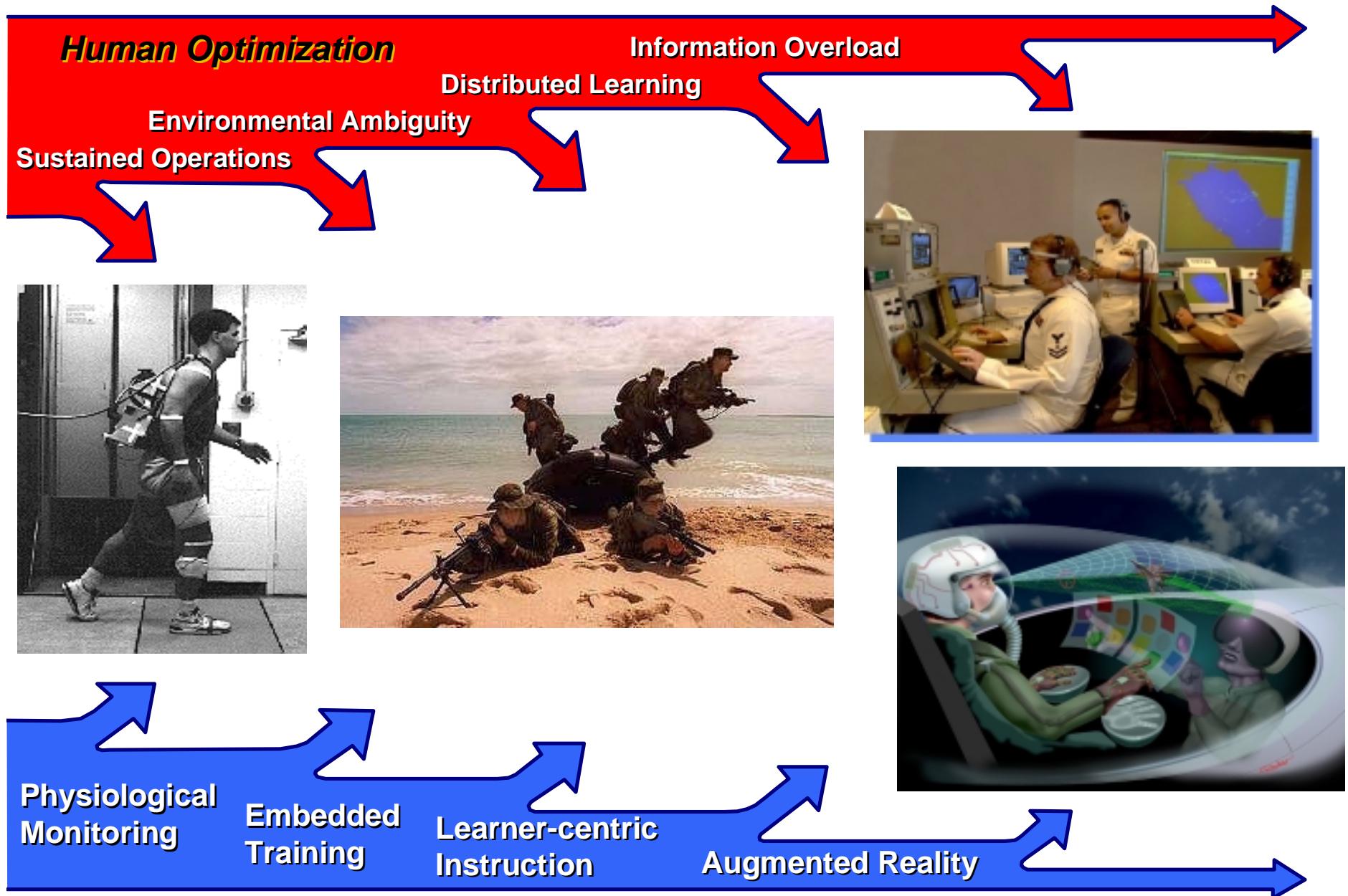
# Hardened and Deeply Buried Targets



# Smart Sensor Web



# Cognitive Readiness



# High Performance Computing Modernization Program

Mission: Provide world-class HPC capability to the DoD science and technology and developmental test and evaluation communities

**HPCMP Resource Centers**

**MSRCs**

**Major Shared Resource Centers**

- Networked very large computer centers
- Top 30 facilities in speed and storage

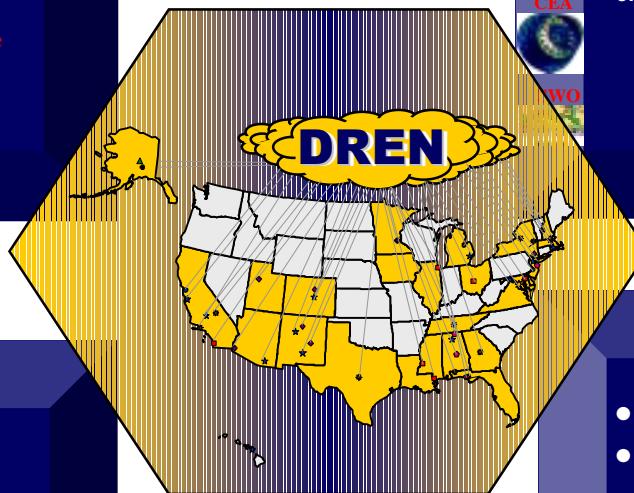
**Distributed Centers**

- Complements MSRCs
- Supports local missions (real-time processing)

**DoD Challenge Projects**

DoD Challenge Projects: competitively selected as pathfinding applications addressing mission-critical requirements.

- **28 Challenge Projects selected for FY99**
- **16 continuing projects**
- **12 new projects**



**CHSSI**

**PET**

**CSM**

**CFD**

**CCM**

**CEA**

**DOE**

**SP**

**FMS**

**EQM**

**CEN**

**IMT**

**Common HPC Software Support Initiative**

- Provides multi-purpose codes that perform on a range of HPC platforms,
- Develops critical DoD software that can execute in a scalable computing environment

**Programming Environment and Training**

- Full-spectrum HPC technology transfer program
- Partners: Top academic institutions (NCSA, SDSC, 20+ academic institutions)

**Requirements Analysis**

- Questionnaire:
- Interviews: Service Validation: Ensures that only approved and funded projects are included
- Requirements Analysis Database:

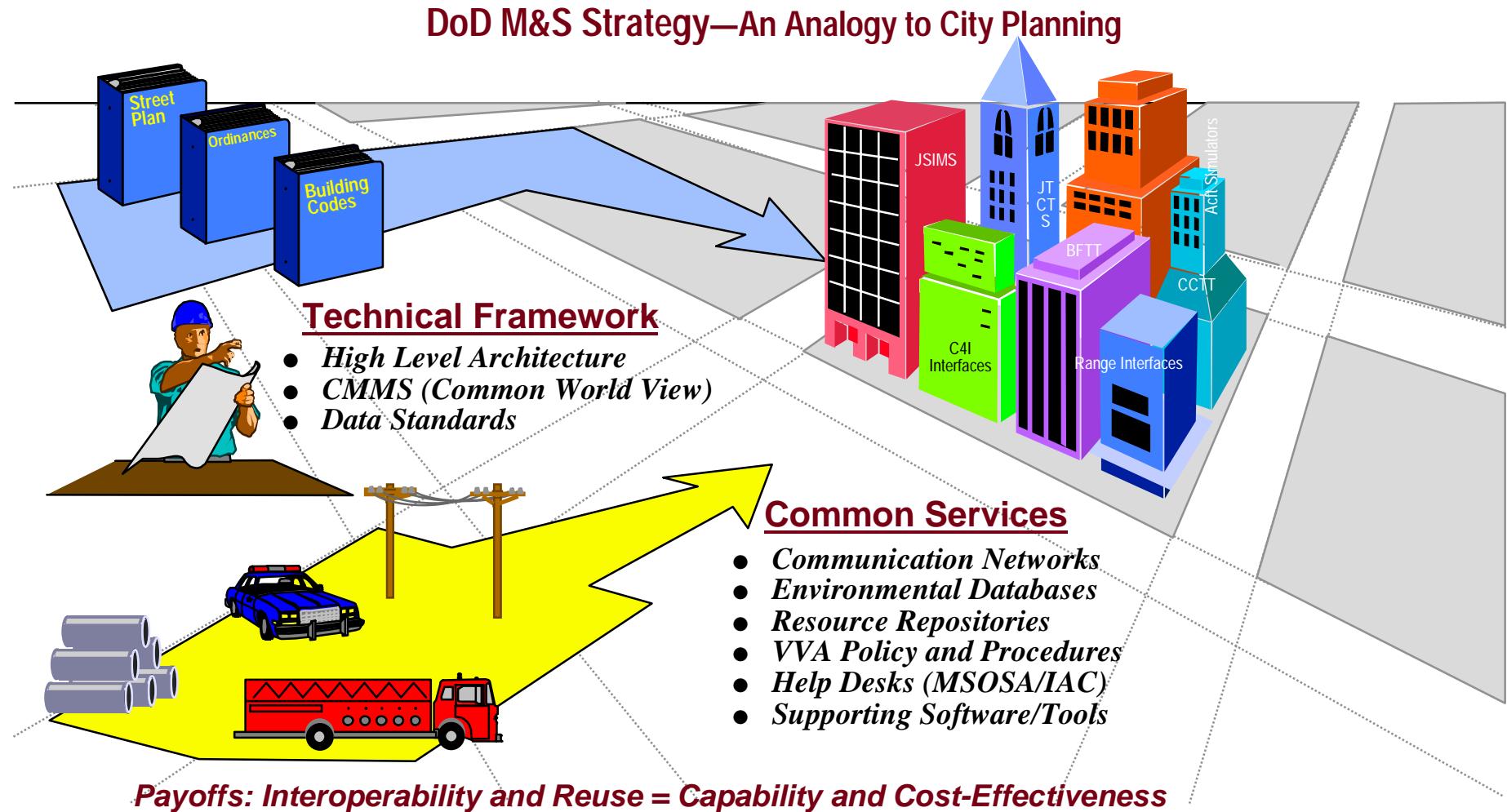
**Resource Allocation**

**Goal:**

- Approximately 80% allocated by individual Services and Agencies
- Approximately 20% allocated to DoD Challenge Projects



# Defense Modeling and Simulation





# High Level Support

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**“... simulation and modeling can help us ... by reducing the risk ... saving time ... and by making efficient use of scarce and increasingly expensive resources.” \***

**Dr. Jacques S. Gansler**  
Under Secretary of Defense  
for Acquisition and Technology

\* Remarks at the May 19, 1998, Precision Strike Association Annual Program Review, Ft Belvoir, Virginia

# Corporate Functions of DMSO

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- **M&S Standards Development**
- **M&S Education & Training**
- **Interaction with Joint M&S Programs**
- **Leadership of New M&S Initiatives**
- **Strategic Thrusts with M&S Community**



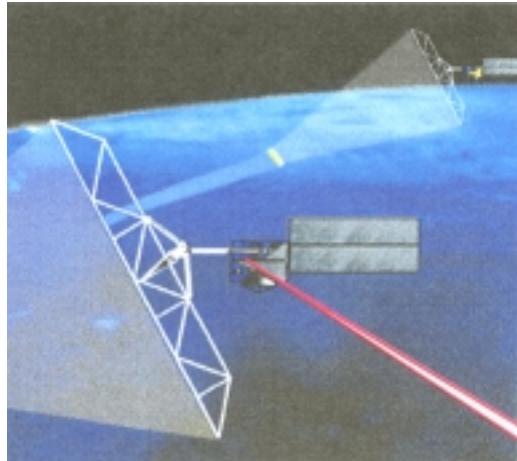
# DoD S&T is a Partnership

Stable, Long Term Investment



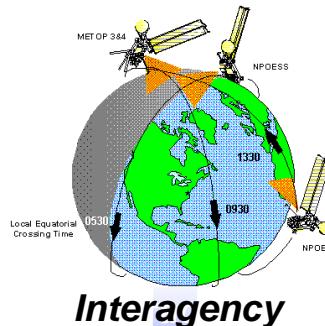
Service Labs

DARPA

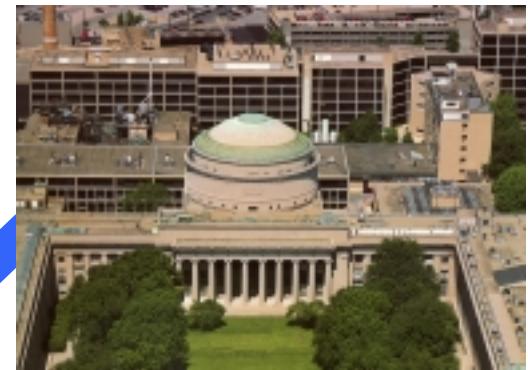


High Risk, High Payoff

Expanded Resource Base



New Ideas, Knowledge



Universities

Industries



Innovation, Transition

Maximum National Security Payoff

International



Coalition Capability